Configuration Management News

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INSIDE

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Capability Maturity Model Process Improvement

Mark D. Schaeffer ***Office of the Under Secretary of Defense***

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The Software Engineering Institute (SEI) is a federally funded Research and Development Center with the mission to accelerate the most effective technology and practice of modern software engineering. The SEI is funded primarily by the Department of Defense (DoD) but also accepts work from other government organizations as well as the private sector via Cooperative Research and Development Agreements.

The centerpiece product of the SEI has been the Software Capability Maturity Model (CMM) released in 1991. This model has contributed to widespread success in assisting organizations in improving their efficiency in developing quality software products. The success of the Software (SW) CMM spawned other CMMs that address a wide range of subjects.

A CMM provides an organization a conceptual framework within which specific processes, e.g., configuration management and quality, can be optimized to efficiently improve the capability of organizations. A CMM provides state-of-the-art practices to

- Determine the maturity of an organization's processes.
- Establish goals for process improvement.
- Set priorities for immediate process improvement actions.
- Plan for a culture of product or service excellence.

By focusing on specific processes, an organization can best leverage the resources for their improvement activities while rallying the organization around specific goals. A CMM can be a road map showing an organization how it can systematically move to more mature levels of performance and do it in more effective and efficient ways. After an objective assessment, an organization can set its goals for increasing the capability of its processes. To the DoD, this translates into more affordable products and services for our war fighters.

CMMs can include processes that span the entire lifecycle. Starting with requirements management, they can span the breadth of product development, ensuring quality, lean production concepts, and support to the field. Each individual process includes elements that provide basic practices as well as additional practices that add incremental benefits and maturity. When these processes are sufficiently matured, the organization increases its performance or maturity.

Subsequent to the success of the SW-CMM, other CMMs were developed with SEI support. These CMMs included the Systems Engineering CMM and the Integrated Product Development (IPD) CMM. It became apparent in the development of these and other models that they all contained common processes, e.g., configuration management, quality, and requirements management, supporting the various functional disciplines, software engineering, and systems engineering. Improvements in these common processes could benefit other disciplines.

Further, it became apparent that process improvement resources applied to one functional discipline, e.g., software engineering, could be beneficial to another functional discipline. The common elements used in a software CMM appraisal could be used for a systems engineering appraisal, and there would be no need to redo the appraisal of common elements. In addition, improvement efforts based on unique CMMs could result in suboptimization, confusion, and potentially unnecessary expenditure of process improvement resources.

Acquisition reform in the DoD created a significant paradigm shift away from a "how-to" mentality approach to an approach centered on Statements of Objectives and Performance-Based Requirements. The earlier capability models and standards were clearly used in the context of meeting contract requirements. There were even brief attempts to use them as selection criteria or as compliance benchmarks rather than frameworks to identify and define characteristics of good practices that facilitate process improvement. Remember the Requests for Proposals that required an SW-CMM Level 2 or above to propose? Although DoD Directive 5000 directs we select capable suppliers, it does not direct how it should be determined or set arbitrary levels. DoD has learned over time two important things about maturity levels:

- Many organizations have benefited from the use of CMMs as process improvement tools resulting in delivery of improved products to DoD and government.
- Many projects or products delivered by organizations, purported to be at the SEI Level II or Level III, have not met the customers' requirements.

One of the top-priority projects in the SEI is integration of the CMM products for use in single or multiple functional disciplines. Industry and government along with the SEI now have enough experience in the various functional disciplines to build this framework upon which all present and future CMMs can be based. This will greatly enhance the efforts of CMM users and protect the resources already invested. Organizations can use their previous CMM process improvement work and tailor their future efforts to their unique organization. The initial common framework effort will be based on the SW-CMM, the SE-CMM, and the IPD-CMM. Other functional disciplines may be added later. To efficiently use the government funds allocated to CMMs, further work on CMMs that are not common framework compliant has been halted. The work accomplished to date in Software CMM, Version 2.0 and the IPD CMM have been included in the initial CMM Integration (CMMI) baseline.

In building these CMMI products, the needs of industry and government partners must be understood and met. We have had extensive participation in our reviews of the CMMI requirements, and broad collaborative efforts are underway developing the products. We are depending on the functional discipline experts from industry and government to assist in building the products.

In summary, the CMMI project requires a broad collaborative effort to ensure that the best practices are included and process improvement resources are optimized. Industry along with government and the SEI are participating on a team to build the CMMI products. Since many organizations have already made considerable investments in CMM-oriented process improvement efforts, it is important that the products of this project efficiently integrate into these efforts, and that resources are not wasted on a new approach.

About the Author

Mark D. Schaeffer has over 20 years experience in weapons systems acquisition and program management in the Office of the Secretary of Defense, Naval Sea Systems Command, and as congressional staff. He has been the deputy director for systems engineering since November 1994 and is responsible for policy and implementation of systems engineering, technical risk management, design for manufacturing quality, reliability and maintainability, manufacturing, and acquisition logistics.

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Additional Reading

Configuration Management for Software – by Stephen B. Compton and Guy R Conner
Configuration Management Models in Commercial Environments – by Peter Feiler
Configuration Management Tools: a Detailed Evaluation – by P. Ingram, C. Burrows and I. Wesley
Implementing Configuration Management – by Fletcher J. Buckley
Practical CM - by David D. Lyon
Software Configuration Management – by Edward H. Bersoff, Vilas D. Henderson , Stanley G. Siegel
Software Configuration Management - by H. Ronald Berlack; John Wiley and Sons

Click on the underlined (internet link) title above for a book review.

For extra credit see the FAA iCMM article in the November issue of *CrossTalk* by Linda Ibrahim.
http://stscbbs.hill.af.mil/CrossTalk/crostalk.html

Ten Things Your Mother Never Told You About the Capability Maturity Model

By: Margaret Kulpa ***Abacus Technology***
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This article discusses the 10 most common misconceptions the author has had to overcome concerning software process improvement and the Software Capability Maturity Model. Topics include management vs. developer changes required, having standards in place, consensus vs. steamroller approaches, keeping it simple, and why you cannot expect software process improvement to work unless you give your employees time to do it.

Most organizations that start out on the road toward software process improvement (SPI) using the Capability Maturity Model (CMM) for Software have no clue what this endeavor means. Most managers get sold on the idea based on competitive practices within the industry—"keeping up with the Joneses." This article discusses some common misconceptions about the torturous path to achieving a maturity level.

"What, me change? You've got to be kidding!" Managers think the CMM focuses on changing the way the developers work. What happens is that the CMM forces management to change the way it manages projects. By requiring the development team to collect project data and report it to management, management becomes more aware of the project management process. In some organizations, managers do not want to know in detail what is really happening on their projects. The idea that someone would report to them actual schedule slippages and try to determine a standard deviation becomes incomprehensible. It is not uncommon to shoot the messenger.

What the CMM really provides is the ability to shape your own destiny. By generating procedures to do work, you control your work environment. If management understood that, they probably would not start CMM activities.

"We can't do this. We have to support our users." It is amazing how often supporting the users is used as an excuse to not do CMM work. The CMM absolutely advocates supporting your users. That is why we are in this business. In case we have forgotten—no users, no work. Ultimately, by following CMM guidelines, supporting the user becomes easier because the ground rules have been established.

Change involves not only the developers but also management and the user community. No matter your position, your attitude plays an important role in SPI. For example, the way you do work in your twenties should be different from the way you do work in your forties, or at least it should be based on learning. If you are still doing things the way you always have, you need to re-examine your work and probably your life—and you are probably not the best person to be put in charge of the improvement effort. CMM work is all about change, something such people apparently know nothing about.

Users also need to change. Your users do not have the right to kill you, but that is what they are doing to our aging work force by creating unnecessary stress that contributes to heart attacks, cancers, and other ills. Control is the real issue. People who believe they have some control over their lives tend to be happier and live longer (so say the psychologists). So, to gain control of your project, you must control your users. Why should you accept an "emergency" request at 4 p.m. Friday that will keep you at work all night? Especially when it turns out that that particular user *always* turns in an "emergency" request at 4 p.m. on Friday and does not need the information until later the following week? Those users need to be trained in becoming pro-active and basically getting their act together. If everything is an emergency, nothing is an emergency. This sounds like an area in need of improvement.

"Standards? We don't need standards!" Nowhere in the CMM does it say that standards are required. The CMM does not absolutely *require* anything. The model is not a step-by-step how-to model—it is a framework, a guideline. It tells you *what* you need to do but not *how* to do it. However, the CMM presupposes that you have standards and are trying to follow them. The standards they presuppose you already have are for products like coding standards, templates for a requirements specification, or test case scenarios.

Following standards institutes a basic structure within an organization. So, if you do not have any standards, get some. One place to search is Department of Defense (DoD) military standards, even if you are not a DoD organization. Start searching the Web for military standards as well as for the methods used to implement SPI. They are available, and they are free.

Just do not be anal when you interpret this information (see item 10, "Keep It Simple"). And all standards should be tailored for use in your organization. Do not think that you can use the same standards you used from the place you used to work in your new workplace. They do not fit. They cannot be used. They can be used as a target, but you will need to tailor them.

"Everybody knows what the process is. What's the big deal?" Everybody knows what a process is until they try to define it in detail and write procedures that describe how to follow the process. Then, they shift back to documenting *who* needs to do something rather than on *how* that something is done. They also fall back on product standards (a form for documenting defects found during peer reviews) instead of process standards (*how* to perform the peer review, *how* to detect defects, and *how* to complete the form).

Telling me that "it is the project manager's responsibility to determine schedule estimates" does not tell me *how* that manager is supposed to derive those estimates.

"Collaborative and achieving consensus …" CMM teams usually try to work collaboratively and make decisions by consensus. This concept is great and fosters buy-in and ownership but is extremely time-consuming and expensive. Consensus is *not* majority rules. Consensus means that everyone can live with the decision—they may not love it, but they can live with it. This way of working takes time. If you are on a tight schedule, (CMM work always is) you may need to stop the philosophizing and touchy-feely stuff and steamroll some folks. You will never get 100 percent buy-in from everyone. Take what you can get, and get those procedures written down.

"The CMM requires that a good process be in place." No. It requires that a process be in place that is documented and followed. At first, your process could be awful. That is where the "continuous process improvement" concept comes in. After you hammer out a process, it is piloted, and projects start to use it, refinements will be made until (it is hoped) the process becomes "good." But to start, get something down on paper and use it. Clean it up as you go.

"We need to model our *as-is* process in order to create our *to-be* process." Yes, but I find that organizations take up to a year to do this, only to find that their processes are too ad hoc to be used as a baseline of good practices and lessons learned. I suggest doing a software capability evaluation (which is now done for internal software process improvement) or a CMM-based Appraisal for Internal Process Improvement. These assessment methods can quickly determine consistent practices across the organization as well as strengths and weaknesses. Measurable action plans can be generated based on the results. Tracking progress can also be measured. The thing to remember before starting CMM activities is to determine ahead of time how to measure success. Modeling current processes is great—but will you ever see a return on that investment?

"Tie CMM activities to your business objectives." Of course. There are some things in the CMM that may not make sense for you. For example, having a separate group to do software quality assurance (SQA) may not work if you only have 10 people in your company. The challenge is to figure out a way to perform quality assurance reviews and oversight in an objective, independent manner. And do not confuse "organization" with "company" or enterprise. An organization achieves a maturity level rating—not one project, not an entire company. Without going into detail, an organization *generally* consists of three to eight projects reporting to the same person, like a director or a division head—not an entire company (like IBM).

Do not get stupid about "business objectives." Ultimately, most organizations' business objectives are to achieve Level X by a certain date. If you are not currently doing SQA and do not want to do SQA (because of the cost and because it is overhead) yet you must achieve the level, do not try to be clever and tailor SQA out of the CMM process. Any certified evaluation team will catch you.

"Better, cheaper, faster." This really irks me. When the CMM was written, most organizations had not yet begun the downsizing frenzy. Nowadays, however, organizations have cut their staff to the bare minimum. Management loves the maxim "better, cheaper, faster" and eventually, you will be able to turn out software of better quality, more quickly, and less expensively—*but not at first!* The average time to obtain your return on investment is three to five years.

SPI is expensive. Most organizations either hire outside consultants to start the journey or build it from the inside. Even if you are not hiring consultants, taking people away from coding, i.e., "real work," and having them do SPI costs you time, money, and schedule slippage. So management instead assigns SPI work in addition to existing work to an organization with extreme resource constraints, and it fails. You cannot squeeze additional effort from people who are already overworked. And having these people "work weekends, holidays, I don't care what it takes" violates the CMM principle of establishing and following *reasonable* plans.

"Keep it simple." I like this one. Most organizations start off believing that they can keep their procedures simple—until they try to do it. Writing procedures that are simple and easy to follow, yet are thorough and complete, is extremely difficult. That is why the people on your teams need to be able to write and like to write as well as have a technical background and knowledge of the organization.

Managers in organizations today seem to feel that one person can wear many hats, i.e., a Powerbuilder programmer can also write procedures for how to write a requirements specification. Do you know what happens when you ask that unfortunate "techie" to do that? He breaks out in a cold sweat. Although some people are adaptable and can do many jobs, not everyone can do everything well. Different skill-sets are required for different jobs.

Another problem is that teams often catch the improvement fever. They want to improve everything. The challenge is to stay focused and use the CMM for software as your guide, but do not attack more than you can handle at one time. Remember: SPI is continuous improvement. It is iterative. Do what you can do in the time allotted, then go back and pick out more things once you have been allocated more time to do them.

Conclusion

Although there are other points to ponder when attempting this journey down the CMM path, these are the most frequently found errors made that I have documented. Good luck on your journey.

About the Author

Margaret Kulpa is a consultant with Abacus Technology Corp. in Chevy Chase, Md. She is a certified lead evaluator and is authorized to teach the SEI's Introduction to CMM and the Software Capability Evaluation class. She has performed SPI duties for over 15 corporations and has evaluated over 30 organizations. She has also written and taught Key Process Area classes for Levels 2 and 3.

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What is *CrossTalk*

CrossTalk, The Journal of Defense Software Engineering is an approved Department of Defense journal. *CrossTalk's* mission is to encourage the engineering development of software in order to improve the reliability, maintainability, and responsiveness of our warfighting capability and to instruct, inform, and educate readers on up-to-date policy decisions and new software engineering technologies. Articles concerning the subjects identified below can be found at the *CrossTalk* internet site, which can be reached at:

http://stscbbs.hill.af.mil/CrossTalk/crostalk.html

Ada
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Implementation
Measurement and Metrics
Outsourcing
Platform Technology
Process Defininition
Process Enactment
Process Improvement
Process Modeling
Project Management
Quality
Reengineering
Requirements Analysis &
Design Reuse
Requirements Engineering
Security
Software Engineering
Testing

Easier Way to Print DOCCON Reports

By: Bob Payne

DOCCON has been modified to make it easier to print reports.

DOCCON was originally designed to print reports on mainframe printers. Today, however, most DOCCON users no longer have access to a mainframe printer, and rely instead on shared printers attached to their local LAN. Printing reports that were generated on a mainframe system such as DOCCON on a local printer required users to manually download DOCCON reports to their PC, open them in a word processor, reformat them, and then print them. This process was time consuming, and often confusing and frustrating.

On November 7, ASD-220 installed software on DOCCON that will automatically download reports in Word format so that you can print them on your LAN printer. But in order to take advantage of this new DOCCON feature, you have to install software on your PC as well. Installation is easy, and should take no more than about 5 minutes. After you install the software on your machine, you can use it to automatically send a DOCCON report to your PC and open it in Word format.

ASD-220 hopes that all DOCCON users will take advantage of this new DOCCON feature. The new software will make it very easy to retrieve data from DOCCON. The software you have to install on your PC, installation instructions, and phone support is available from Bob Payne at 202-651-2272.

Internet Links

Some of you may have noticed the bright blue underlined words. These words and/or phrases are links to the internet. If you have **Microsoft Internet Explorer 4.0** installed on your computer clicking on an embedded link will take you to the web site for that link. Try it and see what happens.

We have seen several comments in cc:Mail concerning the use of certain types of software being used to forward case file/NCPs for review. Many of these comments concern the lack of access to Adobe Acrobat Reader. Well the internet address below will help you obtain your free copy of Adobe Acrobat. Also, located below are several other internet addresses containing some very interesting reading on Configuration Management.

Adobe Acrobat v3.01 Download Page

Configuration Management Yellow Pages

Practical CM

NAS Configuration Management

FAA Intranet

Essentially, an Intranet is the use of Internet technologies within an organization to achieve better results than the conventional means of data access and transfer. Intranet helps in cutting costs, easy and fast accessibility of day to day information on an up-to-date basis to employees spread over different locations, also assuring communication with the outside world as it is connected to the Internet. **How is it different from "the" Internet?** Generally speaking, an **Intranet** is different from an Internet in the following ways: **Intranet has access to Internet but not vice-versa**

Whenever you pick up a newspaper or watch the television, chances are that you'll see a reference to the Internet. The Internet has caught the imagination of businesses, business people and individuals alike. Originally developed for sharing and communicating information between universities, government and commercial researchers, the Internet has grown into a world-wide network with millions of users. The individual component areas which make up the Internet are not necessarily new to the corporate organizations. It is the fact that, in the context of the Internet, these mechanisms, methods and technologies follow consistent standards which has the significant effect, when applied within a corporate organization.

So is the Internet actually competitive to the Intranet? No! To put it all in context, the Internet continues to define the technologies available for external communication, whereas the Intranet is the application of these technologies within your organization and centered around the corporate LAN.

We have provided you with many Internet and Intranet links in this document. The intranet link for **NAS Configuration Management** is the **FAA CM Home Page** and provides information concerning the FAA CM Process and links to IPT pages and the FAST Tool which provides links to the Acquisition Management System. The Telecommunications IPT is not identified on the CM Home Page so their link is provided below.

Telecommunciations Integrated Product Team

SPECIAL THANKS

Configuration Management is vital to the successful implementation of the NAS. Through the efforts of several individuals the program is making great strides toward fulfilling established goals. The CM Program would like to thank those individuals whose assistance has been invaluable during the past months.

Thanks for a job well done.

Frank Cadavos, ANI-750
Cornelius Eastman, AAL-472
Mike Harrison, ACE-472
Dave Stutler, ACE-510
George Johnston, Supervisor, ANM-471
Art Wilson, ANI-322

Highlights

New England Region reports the completion of CM baseline drawings for the Caribou, ME ARSR-4 site. This brings the New England percentage of completion to **93.75 %**.

Southern Region reports the completion of CM baseline drawings for the Huntsville, AL ATCT and Ft. Lauderdale, FL ATCT. This brings the Southern Region percentage of completion to **56.76 %**. The Southern Region currently has drawing redlines for 10 other facilities in CAEG. The addition of these sites will bring our percentage to **70.27 %**. In an effort to ensure the accuracy of Southern Region CM drawings we have commenced auditing facilities under CM. The first site audit was conducted in October at the ATCT in Columbia, SC.

The Great Lakes Region reports the completion of baselining activities for Mansfield, Ohio. This brings the Great Lakes percentage of completion to **62.96 %**.

The Western Pacific Region reports the completion of baselining activities for San Diego and Los Angeles International. This brings the Western Pacific percentage of completion to **40.30 %**.

The edition of these sites brings our national percentage of baseline facilities to **50.87 %**.

Welcome

The Great Lakes Region is pleased to inform you about a new employee to the operations section, AGL-471. Jobi Kennedy, has excepted a job with the AGL-471 team. Jobi, will split her work time between various programs including, CM, NASTEP, and Safety. Her phone number is (847) 294-8465 and the fax is (847) 294-7133. She will be the AGL contact for routing national NCPs, cc:Mail is (Kennedy CTR Jobi).

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